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(19) (CA) **CANADIAN PATENT** (12)

(54) Door Interlock for Electrical Apparatus

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ABSTRACT OF THE DISCLOSURE

A door interlock for electrical apparatus, which may include a switch, within an enclosure, permits the door of the enclosure to be opened only if the electrical apparatus is in a predetermined condition, such as switch-closed. Once the switch has been opened, the door may be opened. The interlock prevents the switch from being reclosed as long as the door is opened. A latch holds the door closed if the switch is closed, if the door is locked closed by a door lock, or if both conditions obtain. If the switch is opened while the door lock is locked closed by the door lock, the latch continues to latch the door closed. If the door lock is unlocked the door while the switch remains closed, the door latch likewise latches the door closed.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An improved interlock for electrical apparatus located in a walled enclosure, the interlock being of the type which prevents opening a door of the enclosure if the apparatus is in a first condition and permits opening the door to provide access to the apparatus only if the apparatus is in a second condition, the interlock preventing the apparatus from assuming the first condition when the door is open, wherein the improvement comprises:

latching means movable between a first position, for latching the closed door ~~is latched~~ against opening, and a second position, for unlatching the closed door for opening;

cam follower means movable between a first position, for holding the latching means in its first position, and a second position, for holding the latching means in its second position;

means for biasing the cam follower toward its second position;

locking means operable from the exterior of the enclosure and movable between a first position, for locking the closed door against opening and for holding the cam follower means in its first position, and a second position, for unlocking the closed door for opening and for freeing the cam follower means for movement to its second position by the biasing means, the closed door being openable only if the locking means and the latching means are both in their second positions;

movable control means movable between a first and a second position, the control means being unable to move out of its first position if the apparatus is not in its second condition and being movable to its second position only if the apparatus is in its second condition;

means for preventing the apparatus from assuming its first condition if the control means is in its second position; and

means interconnecting the control means and the cam follower means for

(a) holding the control means in its first position when the cam follower means is held in its first position,

(b) moving the control means to its second position when the cam follower means moves to its second position and the apparatus is in its second condition, and

(c) preventing the cam follower means from moving to its second position if the control means is unable to move to its second position.

2. An interlock as in Claim 1, wherein

the cam follower means is on the enclosure,

the locking means and the latching means are partly on the door and partly on the enclosure, and

the control means is associated with the apparatus.

3. An interlock as in Claim 2, wherein

the latching means comrises

a latching bracket on the rear surface of the door,

a pin on the interior of the enclosure, and

a latching lever pivoted on the pin, one end of the latching lever engaging the latching bracket in the first position of the latching means and disengaging the latching bracket in the second position of the latching means;

the cam follower means comprises

a plate pivotally mounted on the pin,

a first member on the plate for engaging the latching lever near its other end when the cam follower mean is in its first position to effect engagement of the latching bracket by the one end of the latching lever, and

a second member on the plate for engaging the latching lever near its one end when the cam follower means is in its second position to effect disengagement of the one end of the latching lever from the latching bracket;

the biasing means comprises

a spring connected between the second member and the pin to bias the plate for pivoting which brings the second member into engagement with the latching lever near the one end thereof;.

the locking means comprises

a locking bracket on the enclosure,

a locking lever rotatably mounted on the rear surface of the door,

a cam member on the latching lever which engages the plate in the first position of the locking means to effect engagement of the latching lever by the first member, movement of the locking means to its second position disengaging the cam member from the plate so that the spring may move the plate to its second position if the control means is movable to its second position, and

a handle on and manipulable from the front surface of the door to rotate the locking lever into and out of engagement with the locking bracket when the door is closed and to move the cam member into and out of engagement with the plate;

the control means and the preventing means comprise

a cam with a notch in a cam surface thereof, the cam moving as the condition of the apparatus changes to position the notch at a first position, when the apparatus assumes its first condition, or a second position, when the apparatus assumes its second condition,

a pivotally mounted arm having a stud thereon, the arm being freely movable between a first and a second position corresponding to the first and second position of the control means only when the notch is in its second position whereat it is enterable by the stud, the arm being unable to move out of its first position when the notch is not in its second position due to interference between the cam surface and the stud, entry of the stud into the notch preventing the notch from moving out of its second position and preventing the apparatus from assuming the first condition; and

the interconnecting means comprises

a control cable attached between the arm and the first member on the plate so that the arm and the plate assume complementary positions.

4. An improved interlock for electrical apparatus located in a walled enclosure, the interlock being of the type which prevents opening a door of the enclosure if the apparatus is in a first condition and permits opening the door to provide access to the apparatus only if the apparatus is in a second condition, the interlock preventing the apparatus from assuming the first condition when the door is open, wherein the improvement comprises:

locking means on the door and operable from the exterior of the enclosure for movement between a first position, whereat the closed door is locked against opening, and a second position, whereat the door is unlocked for opening;

latching means on the enclosure for movement between a first position, whereat the closed door is latched against opening, and a second position, whereat the door is unlatched for opening, the closed door being openable only if the locking means and the latching means are both in their second positions;

cam follower means on the enclosure for movement between a first position, whereat the latching means is held in the first position, and a second position, whereat the latching means is held in its second position;

means for biasing the cam follower toward the second position;

cam means on the locking means for holding the cam follower means in its first position when the locking means is in its first position and for freeing the cam follower means for movement to its second position by the biasing means when the locking means is in its second position;

movable control means on the apparatus for movement between a first and a second position, the control means being unable to move out of its first position if the apparatus is not in its second condition and being movable to its second position only if the apparatus is in its second condition;

means for preventing the apparatus from assuming its first condition if the control means is in its second position; and

means interconnecting the control means and the cam follower means for

(a) holding the control means in its first position when the cam follower means is held in its first position,

(b) moving the control means to its second position when the cam follower means moves to its second position and the apparatus is in its second condition, and

(c) preventing the cam follower means from moving to its second position if the control means is unable to move to its second position.

5. An interlock as in Claim 1 or 4, wherein

with the door closed, as the locking means moves from its second position toward its first position, and before the latching means is moved out of its second position by the cam follower means as the cam follower means is moved from its second position toward its first position by the locking means, the interconnecitng means affects sufficient movement of the control means from its second toward its first position so that assumption of the first condition by the apparatus moves the control means fully to its first position and the interconnecting means moves the cam follower means fully to its first position, thereby moving the latching means fully to its first position.

6. An interlock as in Claim 1 or 4, wherein

the apparatus includes a high voltage switch which is closed in the first condition of the apparatus and is open in the second condition of the apparatus.

7. An interlock as in Claim 1 or 4, wherein the door is relatively movable with respect to an opening formed through a wall of the enclosure, and wherein

the locking means includes

a locking bracket on the rear surface of the wall,

a locking lever rotatably mounted on the rear surface of the door, and

a handle manipulable from the front surface of the door to rotate the locking lever into and out of engagement with the locking bracket when the door is closed.

8. An interlock as in Claim 1 or 4, wherein the door is relatively movable with respect to an opening formed in a wall of the enclosure, and wherein

the latching means includes

a latch lever rotatably mounted on the rear surface of the wall,

a latch hook on the latch lever,

a first latch bracket mounted to the rear surface of the wall, having a pair of upstanding side walls between which a portion of the latch lever rotates, one side wall being abutted by the latch lever in the second position of the latching means, the other side wall having a slot therethrough for guiding the latch hook and through which the latch hook protrudes in the first position of the latching means, and

a second latch bracket mounted to the rear surface of the door and having a slot therethrough entered by the protruding latch hook in the first position of the latching means to prevent relative movement between the latch brackets and thereby latch the closed door against opening.

9. An interlock as in Claim 1, wherein

the latching means includes

a latching bracket on the rear surface of the door, and

a latching lever pivoted on the interior of the enclosure, one end of the latching lever engaging the latching bracket in the first position of the latching means and disengaging the latching bracket in the second position of the latching means; and

the cam follower means includes

a plate pivotally mounted on the interior of the enclosure,

a first member on the plate for engaging the latching lever near its other end when the cam follower means is in its first position to effect engagement of the latching bracket by the one end of the latching lever,

a second member on the plate for engaging the latching lever near its one end when the cam follower means is in its second position to effect disengagement of the one end of the latching lever from the latching bracket.

10. An interlock as in Claim 4, wherein

the latching means includes

a latching bracket on the rear surface of the door, and

a latching lever pivoted on the interior of the enclosure, one end of the latching lever engaging the latching bracket in the first position of the latching means and disengaging the latching bracket in the second position of the latching means; and

the cam follower means includes

a plate pivotally mounted on the interior of the enclosure,

a first member on the plate for engaging the latching lever near its other end when the cam follower means is in its first position to effect engagement of the latching bracket by the one end of the latching lever,

a second member on the plate for engaging the latching lever near its one end when the cam follower means is in its second position to effect disengagement of the one end of the latching lever from the latching bracket.

11. An interlock as in Claim 9, which further comprises

a pin attached to the enclosure for commonly pivotally mounting the latching lever and the plate,

the biasing means comprising a spiral spring connected between the second member and the pin to bias the plate for pivoting movement which brings the second member into engagement with the latching lever near the one end thereof.

12. An interlock as in Claim 10, which further comprises

a pin attached to the enclosure for commonly pivotally mounting the latching lever and the plate,

the biasing means comprising a spiral spring connected between the second member and the pin to bias the plate for pivoting movement which brings the second member into engagement with the latching lever near the one end thereof.

13. An interlock as in Claim 11 or 12, wherein

the interconnecting means includes

a control cable within the enclosure and having a movable portion thereof attached at one end to the plate and at the other end to the control means.

14. An interlock as in Claim 11 or 12, wherein

the locking means includes a cam member which engages the plate in the first position of the locking means to effect engagement of the latching lever by the first member, movement of the locking means to its second position disengaging the cam member from the plate so that the biasing means may move the plate to its second position if the control means is movable to its second position.

15. An interlock as in Claim 1 or 4, wherein

the control means includes

a member movable between a first and second position in accordance with the condition of the apparatus, and

a locking lever movable between a first position, whereat the member is freely movable as the condition of the apparatus changes, and a second position, whereat the member is prevented from moving and the condition of the apparatus is, accordingly, prevented from changing, the locking lever being unable to move to its second position unless the member is in its second position indicative of the apparatus being in the second condition.

FIG-1

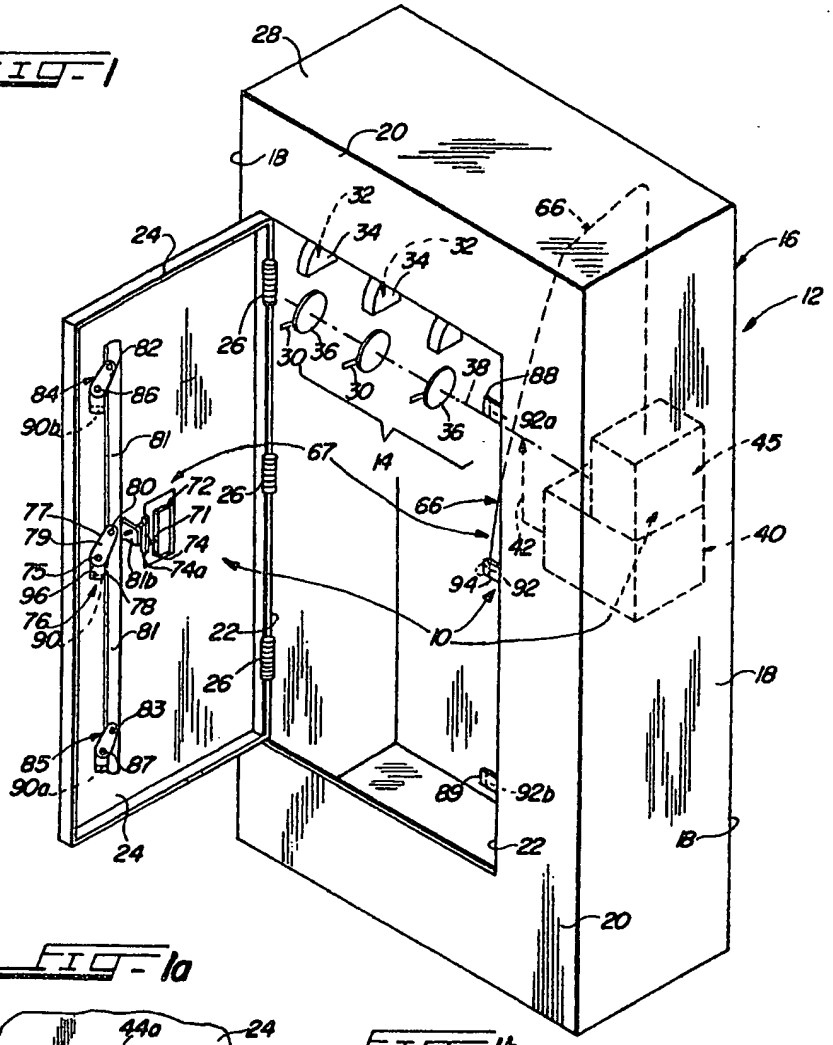

FIG-1a

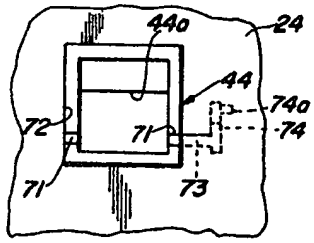

FIG-1b

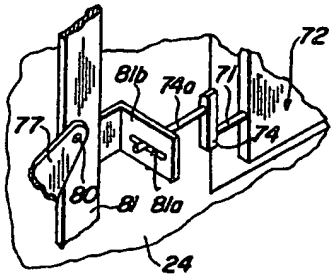

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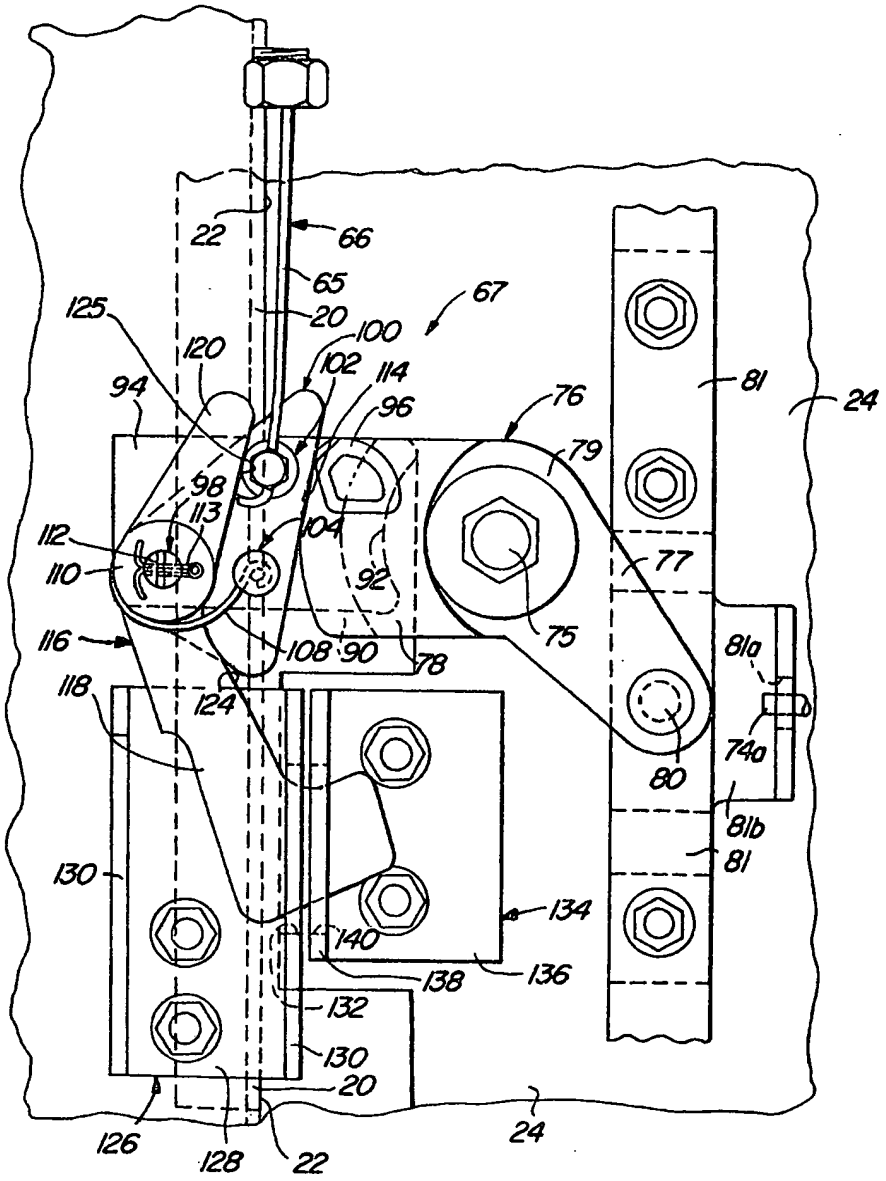
FIG-2



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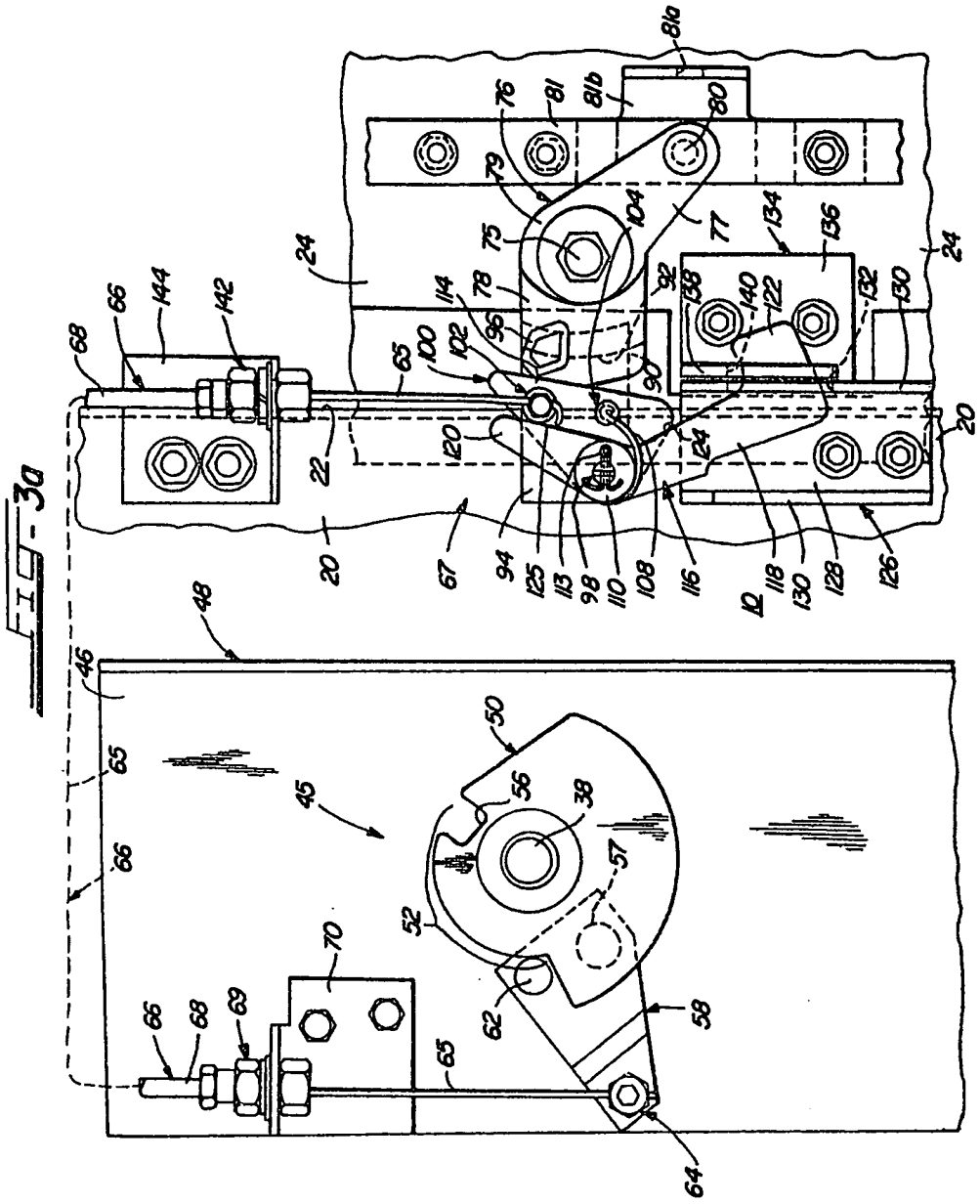

FIG-3a

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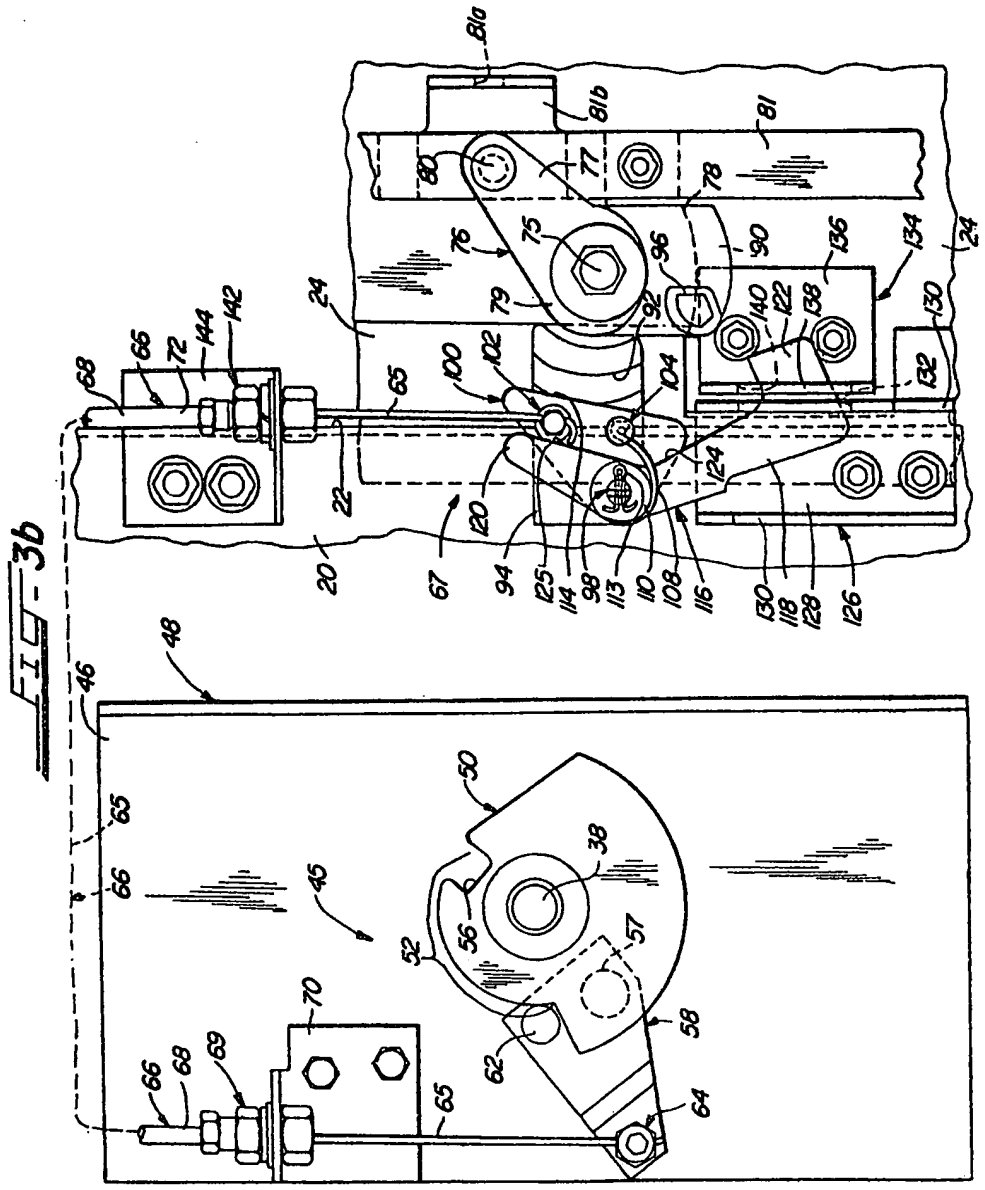

FIG-3b

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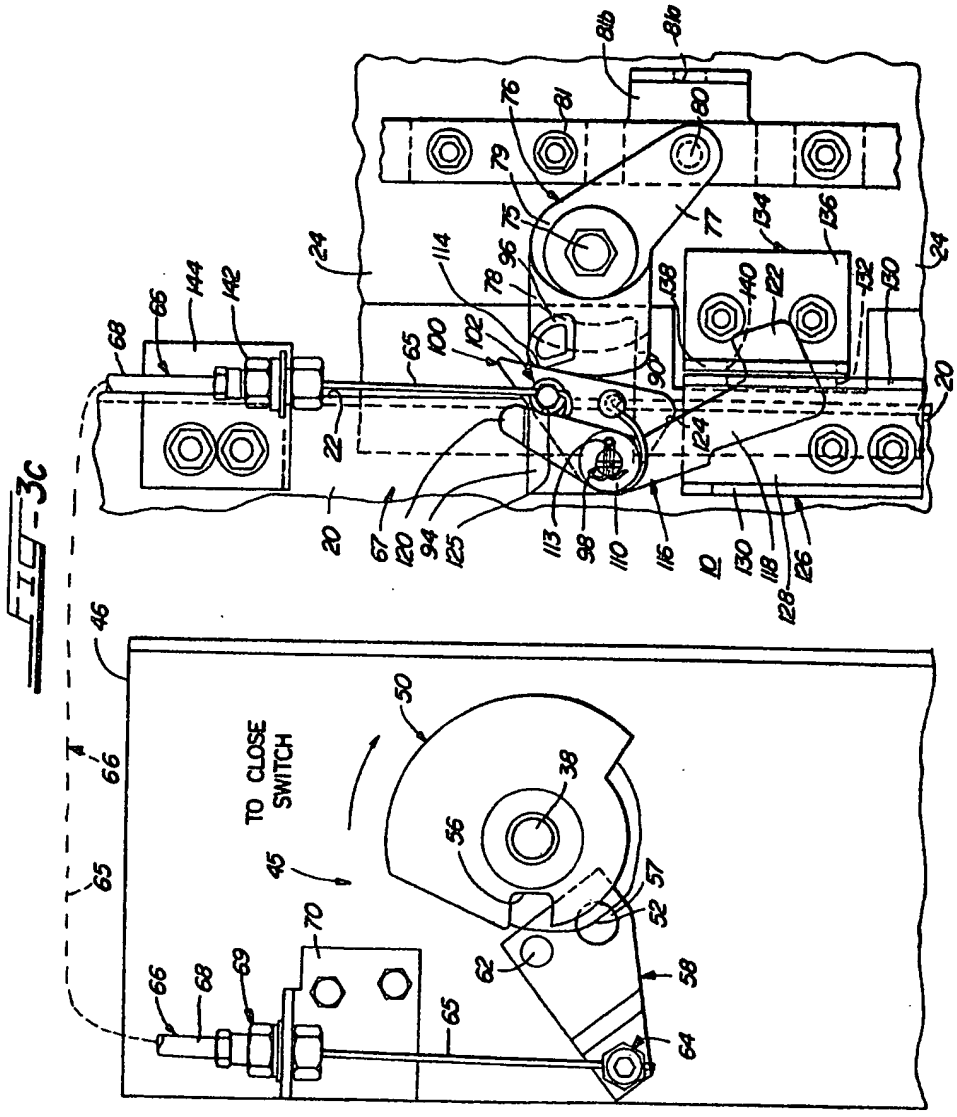

FIG-3C

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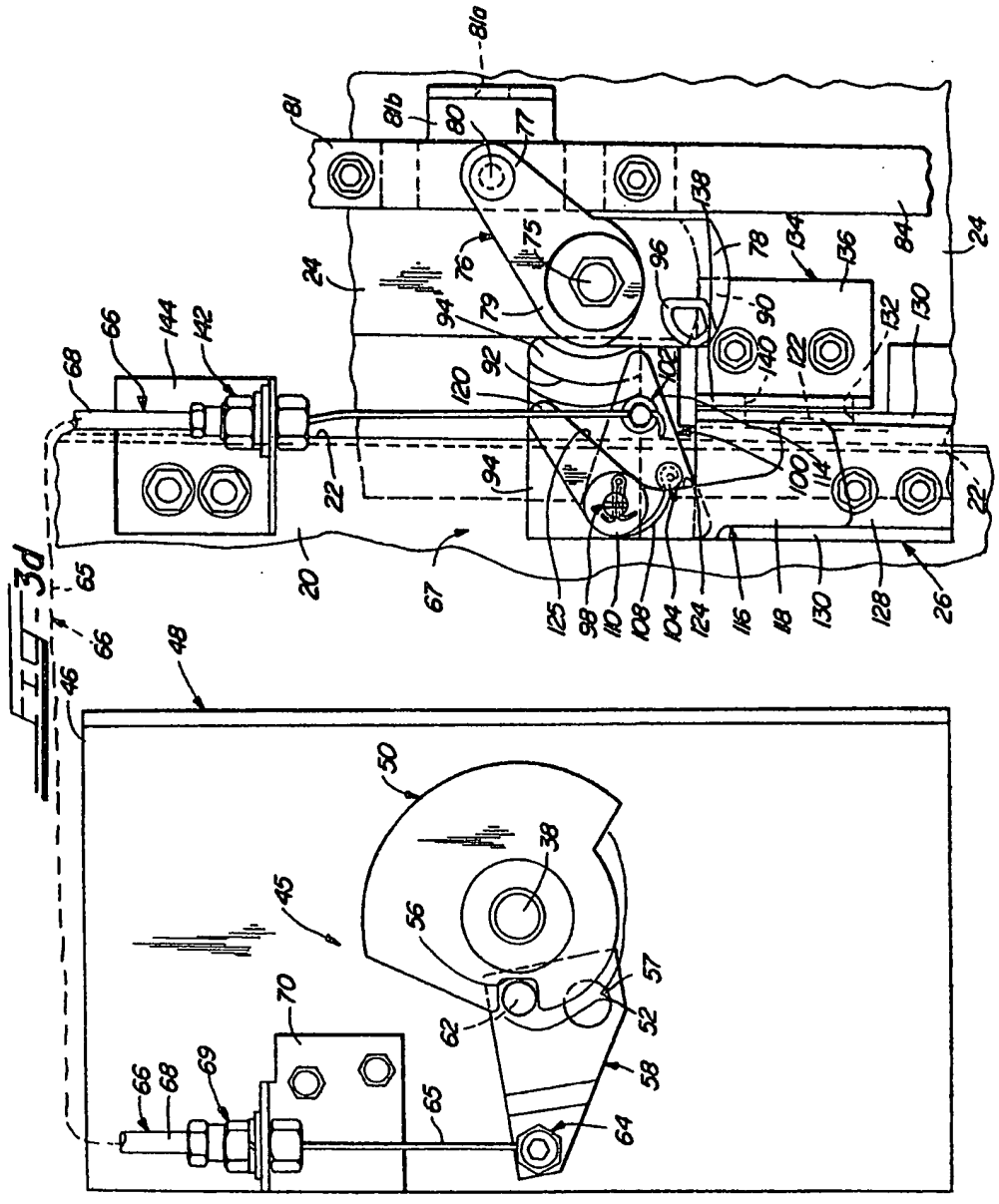

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